

REMARKS

By the present amendment and response, claims 33, 45, 51, and 62 have been amended to overcome the Examiner's objections. New claims 69-72 have been added. Thus, claims 33-72 are now pending in the present application. Reconsideration and allowance of pending claims 33-72 in view of the following remarks are requested.

The Examiner has rejected claims 33-37, 44-48, 51-55, and 62-66 under 35 USC 102(b) as being anticipated by U.S. patent number 6,239,386 B1 to DiStefano et al. ("DiStefano"). The Examiner has further rejected claims 40-41, 49-50, 58-59, and 67-68 under 35 USC 103(a) as being unpatentable over DiStefano. For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 33, 45, 51, and 62, is patentably distinguishable over DiStefano.

Initially, Applicant notes that the present invention is directed to an improved bonding pad and support structure in an IC chip. The present application discloses in detail how the invention's improved bonding pad in an IC chip is achieved by a novel support structure that provides increased mechanical support below the entire area of the bonding pad. As a part of achieving increased mechanical support to the bonding pad, a via pad structure comprising a number of via metal segments is provided. Each of the via metal segments of the via pad structure is situated below the bonding pad, and thus each of the via metal segments provides a column of solid metal support below the bonding pad.

As part of achieving the invention's improved support structure in the IC chip, the present application further discloses providing a number of dielectric fillers to the via pad structure. The dielectric fillers improve the invention's support structure by preventing "dishing" in the via pad structure. As a result, the via pad structure achieves an even profile, which is beneficial to the processing of subsequent layers in the IC chip.

The present application further discloses how the invention's improved support structure in an IC chip is further achieved by utilizing a metal pad structure situated below a via pad structure. The metal pad structure itself comprises a number of interconnect metal segments and a number of dielectric fillers. Also, similar to the via pad structure discussed above, the dielectric fillers in the metal pad structure prevent "dishing" in the metal pad structure.

The present application also discloses how the invention's improved support structure in an IC chip is achieved by utilizing a number of interconnect metal segments and a number of dielectric fillers therebetween. The interconnect metal segments are connected together and form a "pad," while the dielectric fillers prevent "dishing" in the pad.

First, the goal of DiStefano is to provide a structure, i.e. interposer 95, for interconnecting a pair of adjacent circuit panels 98. The interconnection is accomplished by compressing and heating a stack including an interposer 95 sandwiched between the pair of circuit panels 98 to forcibly engage the contacts 80 and 82, i.e. via structures, of the interposer 95 with the pads 100 of the adjacent circuit panels 98. See, for example,

Figure 9 and column 13, lines 58-61 of DiStefano. As such, DiStefano is not directed to a via pad structure situated below and providing mechanical support for a bonding pad in an IC chip. In fact, the method of utilizing heat and compression to forcibly engage the contacts 80 and 82 of an interposer 95 with the pads 100 of the adjacent circuit panels 98 to interconnect the adjacent circuit panels 98 could not be used in an IC chip without damaging the IC chip.

In contrast, the present invention, as defined by amended independent claims 33 comprises, among other things, a composite structure including a via pad structure situated below a metal pad structure in an IC chip, i.e. a semiconductor chip, to provide support for the metal pad structure. The via pad structure includes a number of dielectric fillers utilized to, among other reasons, prevent dishing. Independent claim 45 comprises a method for making the composite structure defined in claim 33. Moreover, the invention, as defined by independent claim 51 comprises, among other things, a composite structure in an IC chip including a metal pad structure situated below a via pad structure. The metal pad structure provides support for the via pad structure in the IC chip. The metal pad structure includes a number of dielectric fillers utilized to, among other reasons, prevent dishing. Furthermore, the present invention, as defined by independent claims 33, 45, 51, and 62 comprises, among other things, a composite structure in an IC chip including a number of interconnect metal segments and a number of dielectric fillers therebetween, which are utilized to, among other things, prevent dishing. Applicant submits that the use of contacts 80 and 82 for interconnecting a pair of

adjacent circuit panels in DiStefano does not at all teach, disclose, or suggest the invention as defined by amended independent claims 33, 45, 51, and 62 as set forth above.

Second, DiStefano does not teach, disclose, or suggest a composite structure in an IC chip including a metal pad structure situated below and providing support for a via pad structure. DiStefano discloses contacts 80 and 82 of interposer 95 engaging pads 100 of adjacent circuit panels 98 to interconnect the circuit panels 98. Thus, interconnect pads 100 are not utilized to support contacts 80 and 82, i.e. the via structures. Instead, interconnect pads 100 in adjacent circuit panels 98 are interconnected by contacts 80 and 82 in interposer 95 by the method of heat and compression discussed above. See, for example, column 14, lines 18-24.

However, as stated above, the present invention, as defined by amended independent claims 33 comprises, among other things, a composite structure including a via pad structure situated below a metal pad structure in an IC chip, i.e. a semiconductor chip, to provide support for the metal pad structure. The via pad structure includes a number of dielectric fillers utilized to, among other reasons, prevent dishing. Independent claim 45 comprises a method for making the composite structure defined in claim 33. Moreover, the invention, as defined by independent claim 51 comprises, among other things, a composite structure in an IC chip including a metal pad structure situated below a via pad structure. The metal pad structure provides support for the via pad structure in the IC chip. The metal pad structure includes a number of dielectric fillers

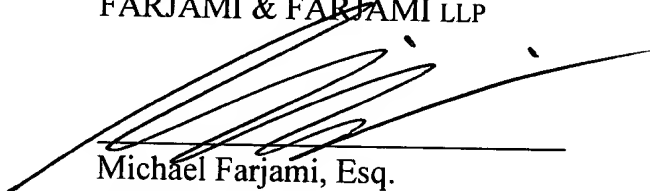
utilized to, among other reasons, prevent dishing. Furthermore, the present invention, as defined by independent claims 33, 45, 51, and 62 comprises, among other things, a composite structure in an IC chip including a number of interconnect metal segments and a number of dielectric fillers therebetween, which are utilized to, among other things, prevent dishing. Applicant submits that the DiStefano disclosure regarding interconnect pads 100 in adjacent circuit panels 98 being interconnected by contacts 80 and 82 in interposer 95 by the method of heat and compression by no means teaches, discloses, or suggests the invention as defined by amended independent claims 33, 45, 51, and 62 as set forth above.

Third, DiStefano uses a flowable dielectric material in layers 94 and 96 as an adhesive to fill the spaces between an interposer 95 and circuit panels 98 to form a multi-layered structure. See, for example, column 14, lines 10-17. By way of contrast, as stated above, the present invention, as defined by amended independent claims 33 comprises, among other things, a composite structure including a via pad structure situated below a metal pad structure in an IC chip, i.e. a semiconductor chip, to provide support for the metal pad structure. The via pad structure includes a number of dielectric fillers utilized to, among other reasons, prevent dishing. Independent claim 45 comprises a method for making the composite structure defined in claim 33. Moreover, the invention, as defined by independent claim 51 comprises, among other things, a composite structure in an IC chip including a metal pad structure situated below a via pad structure. The metal pad structure provides support for the via pad structure in the IC chip. The metal pad

structure includes a number of dielectric fillers utilized to, among other reasons, prevent dishing. Furthermore, the present invention, as defined by independent claims 33, 45, 51, and 62 comprises, among other things, a composite structure in an IC chip including a number of interconnect metal segments and a number of dielectric fillers therebetween, which are utilized to, among other things, prevent dishing. Applicant submits that the DiStefano disclosure regarding the use of a flowable dielectric material to form a multi-layered structure including interposer 95 and circuit panels 98 by no means teaches, discloses, or suggests the invention as defined by amended independent claims 33, 45, 51, and 62 as set forth above.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 33, 45, 51, and 62, is patentably distinguishable over the art cited by the Examiner. As such, dependent claims 34-44, 46-50, 52-61, and 62-68 are also distinguishable over the art cited by the Examiner. Moreover, according to the Examiner, new claims 69-72 would be allowable since they corresponding to claims 56-57 and 60-61 rewritten in independent form including all of the limitations of the base claims and the intervening claims. For all the foregoing reasons, an early allowance and issuance of claims 33-72 pending in the present application is respectfully requested.

Respectfully Submitted,
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